LAB 6

UML Design using StarUML

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Course Code: CS F213 Course Name: Object Oriented Programming

Read the following passage and create a Class Diagram appropriately.

In 1995, the Mayor of New York City Rudy Giuliani asked James Gosling to design a software system to manage the infrastructure of the city, mainly its buildings to maintain an online record for Taxation and Regulatory purposes. After a long meeting with many people, James returned to his office and gave a clear description of the design to his software team. An excerpt from his description follows:

The city consists of buildings which are of type **Building**. Each building has an integer **buildingNumber** which can only be accessed by methods within Building. It also has two string values **buildingName** and an **address** which can also be accessed by derived classes of Building. There are two operations that are done by Building: **calculateValue()** and **currentLoanAmount(),** both of which return an integer. These methods are accessible to all external classes. Finally, Building cannot have objects of its type.

Each building in the city can be either a **CommercialBuilding** or a **ResidentialBuilding.**

Each **ResidentialBuilding** has private information **numberOfHouses** (integer), **houseName** (this is a String array), **houseRent** (this is an integer array) and publicly available methods:

- **calculateParkingSpace()** method returns the percentage of parking space available. It takes two integer arguments: **slots** and **cars** and returns a float value.
- **isParkingAllocated()** method accepts **carName** (String) and **slots** (Integer Array) as arguments and returns true or false.

Each **CommercialBuilding** has private information **license_ID** (String) and a static value **MAX_NUMBER_OF_FLOORS** (int). The value **numberOfFloors** (int) is only available to buildings of base type **CommercialBuilding. CommercialBuilding** cannot have objects of its type. The publicly available methods are

- **calculateTotalFloors()** returning an integer.
- **getLicense()** returning a String.

Two main commercial buildings in the city are **Mall** and **OfficeComplex.**

A **Mall** has the following private information:

- **totalNoOfShops -** which is an integer value
- **MAX_NO_OF_SHOPS -** which is a static integer value
- **shop_ids** - stores the identification number of the shops as an array of integers
- **shop_rent** - stores the rent of the shops in an array of integers

It also has the following public methods

- **calculateTax**(): takes **gst**(float) as an argument and returns a float value.
- **calculateTotalRent()** : takes **surcharge**(float) as an argument and returns an integer.

An **OfficeComplex** stores the following private details

- **totalNoOfOffices** - which is an integer value
- **offices** - stores the names (strings) of offices in an array
- **officeRent** - stores the rents (integer) of the offices in an array
- **MAX_NUMBER_OF_OFFICES** - common integer value for all objects of OfficeComplex type.

The public methods are

- **calculateTotalEmployees** returns an integer value
    - takes one argument **employeesPerOffice** which is an array of integers.
- **evaluateSecurity** returns a Boolean
    - takes one argument **exitsPerFloor** which is an array of integers.

Create a class diagram from all the information given above, generate the Java code using the Java extension and submit to AutolabJS for evaluation.